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Project RAND

An Address by

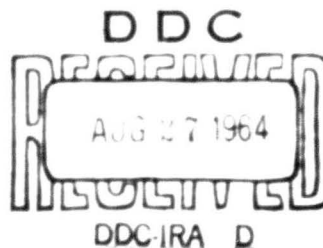
E. R. Collbohm, Director

The RAND Corporation

Before the Scientific Advisory Board

March 24, 1955

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Project RAND

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Some of you here today have known Project RAND from the time, nearly ten years ago, when it was just an idea in the minds of a few people. Others have been closely associated with us in more recent years.

For those who have had less contact with RAND, it was suggested that I present a brief review of our origin and development. I will try to describe RAND's relation to the Air Force, and how we work with industry and with university scientists on military problems. I will show how our research program is formulated and guided in relation to the observed and expressed requirements of the Air Force. I will outline some of the ways in which we do our work. I will say a little about how we communicate the results of our work to the Air Force and to other interested agencies. Finally, I will mention a few of the areas on which we have concentrated.

Over ten years ago General Arnold wrote to Dr. von Karman about the long-range development program of the Army Air Forces. I mention this memorandum of November 7, 1944, because, in a sense, it marked the creation of the Scientific

Advisory Board. It also expressed the views, or at least the state of mind, that led to the establishment of Project RAND.

In his memorandum, General Arnold set forth the principles that he believed should guide "the Air Force's postwar and next-war research and development program." Toward the close of the memorandum, the General asked for recommendations. He wanted to know how the Air Forces could best arrange to get help from scientists in the universities and industry "to assist in avoiding future national peril and winning the next war."

You will remember the Air Force's concern, in those days, about how to sustain the active interest of the nation's scientists in national defense. In this atmosphere, from discussions in the Pentagon with Judge Patterson, General Arnold, General Norstad, and many others, the idea of Project RAND emerged, late in 1945.

Our objective then, as it is today, was to make it possible for a group of civilian scientists to work full time on the analysis of military problems of importance to the Air Force. At the same time, to be effective, such a group would have to maintain a real working relationship with industry and with scientists in our universities.

In the beginning, as a matter of expediency in the light of conditions at the time, Project RAND was set up as a contract with the Douglas Aircraft Company. It was governed by an advisory council of representative aircraft company executives. After two years at Douglas, the RAND organization had grown to the point where it appeared practical to establish a perma-

nent organization designed specifically to conduct research on national security problems. Thus, The RAND Corporation was formed, in 1948, with its own administration, facilities, and Board of Trustees. The Corporation is an independent non-profit organization, operating Project RAND under contract with the Air Force. The Corporation also conducts research for the Atomic Energy Commission and, largely with the earnings from government contracts, some related private research. Our Air Force job and our relations with the Air Force are spelled out in Air Force Regulation 20-9. Let me read you just a few words from it.

"Project RAND is a continuing program of scientific study and research on the broad subject of air warfare with the object of recommending to the Air Force preferred methods, techniques, and instrumentalities for this purpose." This is our statement of work. It was written in General LeMay's office, in 1946, when he served briefly as Deputy Chief of Staff for Research and Development. The key word here is "preferred." We and the Air Force have taken this to mean essentially what it means to economists—that a thing is "preferred" if it accomplishes a given job most cheaply in terms of expenditure of resources, or to put it the other way around, if it provides the greatest capability for a given allocation of resources. Thus, as a research activity, Project RAND's purpose is to assist the Air Force in its goal of getting the most out of its budget appropriations. The budget is, of course, merely a measure of the national resources which the people, through the Congress, have seen fit to make available to the Air Force.

Let me turn back to our Air Force Regulation. It goes on:

"Project RAND was established to provide the Air Force with independent objective analyses of the broad problems of air warfare. . . . Project RAND studies and examines the relative value of alternative strategies, tactics, instrumentalities, and techniques for future air warfare for the purpose of providing analytical information to assist the Air Force in formulating development plans and improved operational and logistical concepts."

Last year, at General Twining's direction, a Project RAND Military Advisory Group was set up to keep him informed on our research and to advise him with respect to Air Force policy toward RAND. The officers comprising the Military Advisory Group include the Deputy Chief of Staff, Development, the Directors of Plans, Intelligence, Research and Development, Management Analysis, and Development Planning, and the Assistant for Logistics Plans. Project RAND is administered by, and works very closely with, the Directorate of Development Planning, headed by General Stranathan. The Military Advisory Group meets with us twice a year to discuss our research program and to hear about the progress of our studies. The group has taken a vigorous interest in RAND and is helping us to make our work more useful to the Air Force.

Last year the Assistant Vice Chief of Staff asked all the principal agencies in the Air Staff to submit to the Military Advisory Group a list of long-range problems judged to be appropriate for RAND study. As a result, 111 problems were submitted. The close correspondence between the Air Staff's

and RAND's understanding of the major problem areas of primary concern to the Air Force is suggested by the fact that about 85 of the problems submitted were already under study or were the subject of studies already scheduled.

Now I would like to describe briefly how we are organized and how we operate.

Corporation policy is determined by the Board of Trustees. Members of the Board are representative of industry, public affairs, and the academic and scientific community.

As in the case of many foundations, our Trustees are in no way typical of the usual board of directors. Most of the members of our Board are experienced in research, and the Board is kept continuously informed on our technical program and the results of our studies. They hear most of our briefings and receive our publications.

RAND is administered by a director and two associate directors, one of them permanently located in our Washington office where he is in continuous, direct contact with Air Force Headquarters. The RAND research program is under constant review and is kept up to date by a Management Committee, comprised of the director, the associate directors, and the chiefs of our seven technical divisions. From the beginning, this program has been based on the best knowledge we could obtain of the problems faced by the Air Force. We are guided by continuing contact with Air Force personnel, both at Headquarters and at operating commands and development centers, and by requests, such as those relayed by the Military Advisory Group.

Just a word about our staff. We now have more than 800

employees, and of these nearly 500 are professional people. More than half the professional staff have graduate degrees, and more than a quarter are Ph.D's. In addition, we have over 150 consultants.

Generally, the scope of our work is indicated by the names of the seven technical divisions of RAND: Aircraft, Economics, Electronics, Mathematics, Missiles, Nuclear Physics, and Social Science. We also have a Logistics Section, a Cost Analysis Section, and a Numerical Analysis Section.

Finally, we have a special group working on a new training procedure for the Air Defense Command.

In RAND this diversification of skills is used to broaden the perspective of our major studies. When such a study is planned, we are able to draw on the various technical divisions for specialists and to assemble these into a team having the skills to examine the problem in a broad context. The team then delegates to the technical divisions the job of making the substudies that produce the detailed components for the larger analysis.

By using mixed teams, our specialists, who are of necessity limited in number, are often able to contribute to several different studies at one time. The technical divisions from which they are drawn devote a major effort to keeping up with the state of the art.

Let me carry my discussion of the use of mixed teams one step further. Part of RAND's effort is the development of suitable analytical procedures for the solution of Air Force problems. One procedure widely used at RAND is what we have called, for lack of a better name, "systems analysis." This is

really an outgrowth, and an extension, of operations research. However, at RAND, as elsewhere, the problems that confront the analysts have become much more difficult and complex than those studied by operations researchers in World War II.

Systems analysis can be looked upon as a framework for examining such problems. It permits the judgments of experts in many fields to be combined to yield results that transcend any individual's judgment. We trust a man's intuition in a field in which he is expert. But in many of our studies we are dealing with problems so broad that no one can be called expert. A typical systems analysis depends critically on many technical factors in several fields of technology; on military operations and logistics factors, both on our side and on that of the enemy; on broad economic, political, and strategic factors; and on quite intricate relations among all of these. No one is an expert in more than one or two of the subfields; no one is an expert in the field as a whole, and in the interrelations. So no one person's unsupported intuitions in such a field can be trusted. The mixed team, working within the framework of systems analysis, can perhaps do better.

Last month about 60 Air Force officers and civilian scientists came to RAND to participate in a course—we called it "An Appreciation of Systems Analyses." It was designed to help the Air Force make better use of the results of studies prepared by RAND, by industrial contractors, and by Air Force agencies. We tried to show both the applications and the limitations of systems analysis, and how it can be useful to Air Force decision-makers.

It is hardly necessary to say that each systems analysis rests on a considerable amount of detailed component research. Our technical divisions, in providing this detailed backup, produce information of use throughout the Air Force. Specifically, to mention just a very few of our component studies, we have analyzed fighter and bomber performance characteristics, compared propulsion systems, studied bomber formations, and examined the likely characteristics of various guidance systems for future missiles.

RAND reports the results of its research to the Air Force in many ways. Perhaps the quickest and most effective way is through personal contacts with the people who do the work and make the decisions. We also give formal briefings at all levels in the Air Force, wherever our results are of interest. We make formal Recommendations to the Air Staff: these go to the Deputy Chief of Staff, Development, and from there to the proper agency for action. We have made more than 30 formal Recommendations. Our most important results are outlined in summary RAND reports to the Air Staff. There are four or more of these a year. Our major technical reports are distributed throughout the Air Force, the Department of Defense, to other government agencies, and, when desirable, to industrial contractors having a specific need-to-know. We publish ten to fifteen of these each year.

To get our current research results out quickly, we issue Research Memoranda, most of which are intended for technical people and working-level staff officers. Last year we issued more than 180 of them.

The Air Force has encouraged us to make our unclassified results publicly available. We have three ways of doing this.

It is hardly news that scientists like to publish papers in their professional journals. About 100 unclassified papers are issued each year—and most of them are published.

Our Air Force contract permits us to arrange for book publication of those reports which should be made widely available. To date we have published sixteen volumes, principally in the fields of political science and economics—specializing largely in Soviet affairs and in mathematics.

As in the case of some of the other research agencies, there is a substantial quantity of unclassified technical material not formally published but of interest to scholars and to the general public. Following the lead of the AEC, we have established a network of 40 deposit libraries across the country where we have placed about 500 of our reports and technical memoranda. A complete index to these deposits can be found in 300 other libraries, and any library can borrow from the deposits.

I have described the way our research results are presented to the Air Force—through reports, research memoranda, recommendations, briefings, and so on. Perhaps I have not emphasized as strongly as I might that these results are also available to the Army, the Navy, and the AEC, and to contractors working on Air Force developments. We have an approved distribution list, broken down by subject matter, that covers not only defense agencies, but also other government departments and industrial concerns having a need-to-know. In addition, we maintain very close working contacts with contractors in nearly

every field of technical development. Our clearance records show an average of about 35 visitors in RAND every day. On the average day about 30 or more of our technical people are away from Santa Monica visiting Air Force Headquarters, Commands, and development centers, or military contractors.

Let me mention some of the major areas in which we have worked.

Early studies at RAND dealt with strategic bombing systems. There were several reasons why this was so. For one thing, many of our original people came from the aircraft industry and so of course we thought we knew something about airplanes. Also, the development of a modern long-range bombardment capability was at that time the Air Force's most important problem. Critical development and procurement decisions in this area had to be made. In view of these circumstances, we felt that the strategic-bombing problem should have priority in our early studies.

Our work on air defense came next, as we were able to assemble the technical manpower to do the job. As a matter of fact, it began rather early, on a small scale. In late 1946, General Spaatz wrote to Dr. von Karman about the air defense problem and suggested that RAND might work on it. In February, 1947, the SAB met and discussed the matter, and, after consulting with us, advised the Air Force that RAND could and would undertake the job. We have completed several major defense-systems studies, and many important components of the over-all problem have been studied in detail.

A third area in which we could anticipate that the Air Force

would be faced with difficult decisions was tactical air. Consequently, we have undertaken work in this area, and RAND teams and individual analysts have been sent to overseas theaters. More specifically, we have had personnel actively working with the Air Force in Japan and Korea, and throughout the Air Force and Joint Commands in Europe. This first-hand knowledge of the real problems and conditions is a prerequisite for any analysis if the results are to be valid and useful.

Slightly more than a year ago we were asked to look into the field of Air Force logistics. We had almost no competence in this area, and, frankly, we recommended that some other organization carry on this research. However, the Air Force gave us such compelling arguments that we were forced to reconsider, and formally to establish, a research program in logistics. We are making progress and can already anticipate some results. During the next year, we will be able to make some recommendations that may permit very substantial improvements in Air Force logistics, and at the same time reduce costs.

Recently the Air Force Long-range Logistics Conference met at RAND. At this time we reported on three specific areas under study: *Logistics procedures*, *transportation methods*, and *policies governing the handling of stocks and spares*. We also described our plans for building up a capability in additional logistics areas. The Air Materiel Command asked that we expand our effort into the field of maintenance even more rapidly than we had planned. You can see the reason for this request: there is an urgent need for answers to questions in this area. But to be really useful these answers must be obtained

before the present system is overwhelmed by the projected introduction of *more, and more complex*, equipments into the Air Force structure.

I have outlined some of the major areas we have been studying and why we got into them. I would now like to turn to the future and to discuss a problem we are trying to look at.

It may be that the probability of a full-scale thermonuclear war is lower now that we are approaching the era of nuclear plenty and weapons parity. We must, of course, always be prepared for a big war. To the extent that we succeed, perhaps we also succeed in reducing its likelihood.

Under such circumstances, the Soviet Union may use the threat of all-out war as a cover in its attempts to make gains in limited or peripheral actions. This general situation poses problems not only with respect to our military posture, but also with respect to our foreign policy.

Today the Air Force has tremendous responsibility in both of these fields. It is not only the dominant branch of our military establishment, it is also the major arm of our foreign policy. Now, foreign policy is—and always has been—only as effective as the military power backing it up.

I do not mean to imply that the reverse is true—a strong military power does not automatically result in effective foreign policy.

As things are going at present, the freedom of action of American policy-makers is directly dependent on our military capability, and, more particularly, on the capability of the Air Force. The mission of the Air Force in a full-scale war is

reasonably clear. How it may be used more effectively for limited wars or in support of foreign policy is not so obvious.

We are just getting into this problem and are trying to develop new analytical methods to deal with it. In this area there is a closer intermeshing of military and political actions and capabilities than in any others we have studied. Our social and political scientists are working closely with our engineering and military hardware people, trying to get a clearer understanding of the implications of military capabilities for political decisions.

This is an example of the way in which RAND modifies its program in an effort to anticipate the Air Force's major needs, and to deal with the increasingly complex and difficult problems which face Air Force decision-makers.